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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte XIAO-AN ZHANG, SUI-HING LEUNG,
KENT D. VINCENT, and ZHANG-LIN ZHOU

Appeal 2009-006959
Application 10/614,855
Technology Center 2800

Decided: January 28, 2010

Before BRADLEY R. GARRIS, TERRY J. OWENS, and
MARK NAGUMO, *Administrative Patent Judges*.

OWENS, *Administrative Patent Judge*.

DECISION ON APPEAL
STATEMENT OF THE CASE

The Appellants appeal under 35 U.S.C. § 134(a) from the Examiner's rejection of claims 1, 13, 17, 29 and 33-40. Claims 2-12, 14-16, 18-28 and 30-32, which are all of the other pending claims, stand withdrawn from consideration by the Examiner. We have jurisdiction under 35 U.S.C. § 6(b).

The Invention

The Appellants claim a three-dimensional molecular switch assembly and a method for making it. Claim 1 is illustrative:

1. A three-dimensional molecular switch assembly, formed on a substrate, said molecular switch assembly comprising:

a first monolayer of seed molecules for initiating self-assembled molecular growth, said first monolayer formed on said substrate;

a second monolayer of active molecules comprising a plurality of rotor moieties and stator moieties, with one rotor moiety supported between two stator moieties, said second monolayer of active molecules formed on said first monolayer of seed molecules, with a one-to-one correspondence between molecules in said first monolayer and said second monolayer;

a third monolayer of spacer molecules, formed on said second monolayer of active molecules, with a one-to-one correspondence between molecules in said second monolayer and said third monolayer; and

a plurality of alternating second monolayers and third monolayers having said one-to-one correspondence, wherein said active molecules are switchable between two different states by an applied external electric field.

The References

Devonald	5,275,924	Jan. 4, 1994
Zhang (Zhang '420)	2002/0075420 A1	Jun. 20, 2002
Zhang (Zhang '557)	2002/0075557 A1	Jun. 20, 2002
Vincent	6,556,470 B1	Apr. 29, 2003

The Rejections

The claims stand rejected under 35 U.S.C. § 103 as follows: claims 1, 13, 17 and 29 over Devonald in view of Zhang '557 or Zhang '420, and claims 33-40 over Devonald in view of Zhang '557 or Zhang '420, further in view of Vincent.

OPINION

We reverse the Examiner's rejections.

Issue

Have the Appellants shown reversible error in the Examiner's determination that the applied prior art would have rendered prima facie obvious, to one of ordinary skill in the art, a monolayer of active molecules comprising a plurality of rotor moieties and stator moieties, formed on a monolayer of seed molecules?

Findings of Fact

Devonald discloses amphiphilic compounds which are useful in forming optical elements used in optical devices, e.g., optical switching devices, particularly optical devices having non-linear optical properties (col. 1, ll. 5-9; col. 9, ll. 53-57). The compounds are particularly suitable for organizing molecules into highly ordered monolayer arrays using the Langmuir-Blodgett (LB) technique (col. 1, ll. 33-34, 44-48). A multilayered film can be formed from multiple monolayers (col. 10, ll. 15-24).

Zhang '557 discloses a molecule comprising at least one rotatable segment (rotor or rotors) which has a large dipole moment and links with at least one other portion of the molecule that is immobilized (stator or stators) (¶¶ 0002, 0015). The molecule is switchable by an external electric field

from one state to another state having different optical properties including color. *See id.*

Zhang '420 discloses a molecule which, due to electric-field-induced bond breaking and charge separation, switches from one state to another state having different optical properties including color (¶ 0003).¹

Analysis

The Appellants argue that Devonald does not disclose seed molecules and that the LB technique does not require seed molecules (Br. 6). The Appellants also argue that one of ordinary skill in the art would not have had a reason to combine Devonald with Zhang '557 or Zhang '420 whose molecular systems operate under completely and fundamentally different physical principles than that of Devonald (Br. 8-12; Reply Br. 6-7).

The Examiner argues that the left end of Devonald's molecule at column 1, line 54 is a first monolayer of seed molecules, the central moiety "X" in the molecule is a second monolayer and comprises rotors and stators, and the right end of the molecule is a third monolayer of spacer molecules (Ans. 4).

In response to the Appellants' argument that Devonald does not disclose seed molecules, the Examiner argues that any molecule which serves for further growth may be called a seed molecule and that LB films are well known to serve as seed molecules (Ans. 15-16).²

¹ A discussion of Vincent is not necessary to our decision.

² The Examiner relies upon additional references in support of that argument (Ans. 16). Because those references are not included in the statement of the rejection, they are not properly before us. *See In re Hoch*, 428 F.2d 1341, 1342 n.3 (CCPA 1970). Accordingly, we have not considered those references in reaching our decision.

The Examiner, however, has not established that the left end moiety on Devonald's molecule at column 1, line 54, which the Examiner relies upon as corresponding to the Appellants' first monolayer of seed molecules, actually is a monolayer of seed molecules or serves for growth of the "X" moiety which the Examiner relies upon as corresponding to the Appellants' second monolayer.

In response to the Appellants' argument that one of ordinary skill in the art would not have had a reason to combine the disclosures of Devonald and Zhang '557 or Zhang '420 the Examiner argues (Ans. 17-18):

One does not need to combine the materials of Zhang with the materials of Devonald.

One of ordinary skill in the art would know to use compatible "seed molecules" and other materials to promote "molecular self-assembly" because that is pivotal to how all the species technologies of the genus work.

One of ordinary skill in the art would not be confused by [the] disclosure of Devonald when considering the teachings of Zhang.

One of ordinary skill in the art would obviously not retain anything of Devonald that would be incompatible with the molecular self-assembly of Zhang because knowledge of such compatibilities is mainstream to molecular self-assembly technology.

...

Zhang teaches the missing material types, method step modifications, and rotor specific limitations with motivation of improved bi-stable switching with improved contrast. The result may be considered a modified Langmuir-Blodgett technique or it may be considered to contrast from traditional Langmuir-Blodgett techniques [lexicography]. Given that Zhang is enabled, one of ordinary skill in the art would have enablement and motivation for a [sic] successfully making a device with the rotors of Zhang that would be a modified three-dimensional multi-layerd [sic] optical device (and method) of Devonald, regardless of the lexicography of whether one

wanted to refer to the technique as being a modified Langmuir-Blodgett's technique.

In that argument, unlike in the explanation of the rejection (Ans. 4), the Examiner does not rely upon the particular molecule disclosed by Devonald. Instead, the Examiner argues that in view of the broad disclosure by Devonald and the enabling disclosure by Zhang '557 or Zhang '420, one of ordinary skill in the art would have formed the Zhang '557 or Zhang '420 molecules into the Appellants' multiple monolayer structure to provide improved bi-stable switching and contrast. As stated in *KSR Int'l. Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007), "[R]jections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness" (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)). The Examiner's argument does not provide the required articulated reasoning with rational underpinning but, rather, is merely an assertion having no established basis in the applied prior art.

Conclusion of Law

The Appellants have shown reversible error in the Examiner's determination that the applied prior art would have rendered prima facie obvious, to one of ordinary skill in the art, a monolayer of active molecules comprising a plurality of rotor moieties and stator moieties, formed on a monolayer of seed molecules.

DECISION/ORDER

The rejections under 35 U.S.C. § 103 of claims 1, 13, 17 and 29 over Devonald in view of Zhang '557 or Zhang '420, and claims 33-40 over

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Application 10/614,855

Devonald in view of Zhang ‘557 or Zhang ‘420, further in view of Vincent
are reversed.

It is ordered that the Examiner’s decision is reversed.

REVERSED

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